Leakage and internal herniation are the most common complications after gastric bypass

Maj-Britt Errebo & Thorbjørn Sommer

ABSTRACT

INTRODUCTION: The aim is to report the diagnostic strategy, clinical findings and treatment in patients admitted on suspicion of early or late complications associated with a previous laparoscopic Roux-en-Y gastric bypass (LRYGB).

MATERIAL AND METHODS: Patients admitted in 2011-2012 to our department with the International Classification of Diseases 10 code DZ980C (condition with a gastric bypass) were identified using the Hospital register system. Patient data including co-morbidity, time between LRYGB and the actual admission, body mass index development, diagnostic strategy, clinical findings and treatment of complications. Early and late complications were defined as </> 30 days post-operatively.

RESULTS: Among 186 patients, the primary early complication was leakage or unexplained abdominal pain. Internal hernia or unexplained abdominal pain was observed most frequently as a late complication. The majority of patients had a computed tomography performed as their first diagnostic procedure. 19% of patients who were operated for internal hernia underwent a re-operation. Among patients undergoing laparoscopy, 72% had internal hernia and 20% had a leak. The length of stay was 18 days for patients with leakage compared to three days for patients with internal hernia.

CONCLUSION: In conclusion, the primary early complication of LRYGB patients was leakage, and internal hernia was the most frequent late complication. A substantial number of the patients who are readmitted after LRYGB suffer from unexplained abdominal pain that should be managed by specialised centres.

FUNDING: not relevant.

TRIAL REGISTRATION: not relevant.

The prevalence of morbid obesity in Denmark has increased in the recent years, and 13% of the population is now estimated to have a body mass index (BMI) > 30 kg/m^2 [1]. The only treatment available that has been shown to yield significant and permanent weight loss is bariatric surgery [2-5], of which laparoscopic Roux-en-Y gastric bypass (LRYGB) is the main surgical procedure performed in Denmark. The prevalence of this operation increased substantially from 174 in 2006 to 4,314 in 2010. At that time, international clinical guidelines were followed (BMI > 35 kg/m^2 and at least one obesity-related co-morbidity or BMI > 40 kg/m^2). The extent of complications after LRYGB for this period has been shown to be very low at high-volume centres, as documented in the obesity report prepared by Kehlet et al on the request of the Danish Ministry of Health from 2011 [6]. However, the debate about bariatric surgery in the press has been characterised by a focus on individual cases with serious complications, whereas the published results from large series of patients (> 1,000) in the surgical literature has gone almost unnoticed [7, 8]. Because of the high number of patients who underwent LRYGB in the years up to 2010, an increasing number of patients admitted with early or late complications have also been observed at the Department of Surgical Gastroenterology, Aarhus University Hospital, Denmark.

In 2010, a nation-wide database for bariatric surgery was created from which annual reports have been published [9]. Since 2010, bariatric surgery in Denmark has been decentralised. This has given rise to several low-volume departments/surgeons now performing LRYGB. The access to LRYGB was also restricted by law in 2010 to patients above 25 years with a BMI > 50 kg/m^2 causing an almost 80% decrease of bariatric surgery in Denmark. From the literature, it is well known that the primary early surgical complications after LRYGB consist of leakage, bleeding or stenosis of the anastomosis [10, 11]. Late surgical complications mainly present as internal hernia, ulcers, stenosis or fistulae [12-14]. The Department of Surgical Gastroenterology L at Aarhus University Hospital is the referral centre for patients with complications after bariatric surgery in the Central Denmark Region which covers a population of almost 1.3 million people. In the 2006-2010 period, the majority of patients were treated at two high-volume private hospitals with > 1,000 annual LRYGB operations. Currently, there are two bariatric centres in this region, but patients are referred from other regions as well. The primary reason for admission is abdominal pain. Since patients undergoing a LRYGB are discharged within 48 hours post-operatively, knowledge of the main complications associated with this operation, the diagnostic strategy that should be used and the treatment available is of interest to both surgeons and general practitioners.

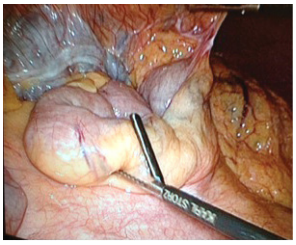
This was a retrospective study of all patients admitted in the period from 1 January 2011 to 31 December

ORIGINAL ARTICLE

Department of Surgical Gastroenterology L, Aarhus University Hospital

Dan Med J 2014;61(5):A4844

Internal hernia.



2012 in our Department on suspicion of early or late surgical complications related to a previous LRYGB. We describe the diagnostic strategy, clinical findings and results of treatment in these patients.

MATERIAL AND METHODS

All patients who were admitted in the period from 01.01.2011 to 31.12.2012 with the International Classification of Diseases (ICD)-10 code DZ980C (condition with a gastric bypass) in our emergency department were identified using the Hospital Register System covering all admissions at Aarhus University Hospital. The medical records were reviewed. Patient data, including time between LRYGB and the actual admission, BMI development, diagnostic strategy, clinical findings and treatment of complications, were recorded in a database. Internal hernia was diagnosed either by direct vision during laparoscopy/laparotomy or using the computed tomography definition: A combination of "mesenteric swirl", compression of the superior mesenteric vein, or dilatation of the small bowel proximal to the anastomosis. Stenosis at the anastomosis was diagnosed by endoscopy (upper anastomosis) or computed tomography (lower anastomosis: dilatation of the biliary limp and the remnant stomach). Early versus late complications were distinguished as being </> 30 days after the LRYGB.

Trial registration: not relevant.

RESULTS

A total of 217 patients with a previous LRYGB were admitted to our emergency department in the study period. Of these, 31 were excluded (three underwent planned laparoscopic cholecystectomy, 22 patients were electively admitted for other procedures and six patients were registered incorrectly) leaving 186 patients for inclusion (**Table 1**). There were 39 men and 147 women with a median age of 37 years (20-63 years). The median time from LRYGB to the actual admission was 24 months (1-224 months). Forty patients were hospitalised < 30 days after LRYGB and 146 > 30 days after LRYGB. BMI decreased from 45 (32-69) kg/m^2 before LRYGB to 27 (20-56) kg/m^2 registered at admission to our Department. The early and late complications found are shown in **Table 2**. The primary early complication was leakage (12 gastro-jejunal and three jejuno-jejunal) or unexplained abdominal pain. Internal hernia or unexplained abdominal pain was observed most frequently as late complications. Among 89 patients undergoing operation due to internal hernia, 17 (19%) underwent a re-operation (eight re-herniations, one port bleeding, one small bowel perforation, four adherence problems, three re-laparoscopies with no findings). Stenosis at the anastomosis was seen both as an early and a late complication. Gastro-jejunal stenosis was treated by endoscopic dilatation with an 18 mm balloon, and stenosis at the jejuno-jejunostomy was treated by creation of a new anastomosis, and when needed also by insertion of a gastrostomy tube to deflate the remnant stomach. The majority of patients underwent a computed tomography as the first diagnostic procedure, whereas a laparoscopy was performed in cases of severe abdominal pain (**Table 3**). Laparotomy was performed in 5/40 of patients with early complications compared with only 2/146 patients with late complications. In patients undergoing laparoscopy as the primary procedure, 18/25 (72%) of patients had internal herniation and 20% had a leak (**Table 4**). A normal computed tomography did not completely exclude internal hernia which was found in 6/36 patients with a normal computed tomography. Length of stay was significantly longer for patients with leakage (18 days (2-64)) compared with patients with internal herniation (three days (1-38 days)). There was one death due to necrosis and leakage of the gastric pouch. In this case, the patient developed severe peritonitis causing multiple organ failure.

DISCUSSION

Leakage was the primary finding in patients admitted with early complications, whereas internal hernia was the most frequent condition in patients with late complications. From the national database, we know that in the period from 2010 to 2012, the percentage of patients readmitted < 30 days after LRYGB increased from 4% to 8%, and the percentage of patients undergoing a re-operation increased from 2% to 4%. This doubling in complication rates reflects the decentralisation of LRYGB from high-volume to low-volume departments/surgeons and should cause serious concern in the medical societies [6]. Since the focus in the press was on single cases with complications, the fact that decentralisation parallels the increase in complication rates was missed completely. We know that the number of early complications in Denmark after LRYGB performed in the 2006-2010 period was very low [6], but these constitute a minor part of our material since the median time from primary surgery for readmissions in our department was 24 months. The leakage rate has been demonstrated to be < 1% in high-volume centres [7, 8], which is much

lower than that observed for colorectal surgery. The association between a longer hospital stay and a case of mortality in a patient with a leakage underlines that a leak is a high-risk complication requiring rapid and appropriate intervention with drainage, stenting or re-suturing to curb the infection in these patients. It is expected that more patients will be readmitted either with late RYGB-related complications or conditions that do not necessarily relate to bariatric surgery [6]. The Danish Obesity Report 2012 states that 3.3% of 11,498 patients with a previous RYGBP later experienced surgery for internal hernia [9]. The long-term incidence of internal hernia remains unknown, but is likely to increase with time [14, 15]. A main problem is that we do not have an ICD-10 code, which specifically addresses internal hernia after LRYGB. In addition, there is no ICD-10 code for the operative procedure for internal hernia specifying the operation performed (suturing, clips or glue). Currently, there is no clear consensus concerning the need for primary closure, but ongoing studies will build evidence allowing us to answer this question in the future [16].

The fact that 19% of the patients who are operated for internal hernia were re-operated reflects that this operation may not be an easy procedure. After LRYGB there are two spaces that should be closed: Petersen's space between the efferent limb and the transverse colon and the space under the jejuno-jejunostomy. In our experience, the latter may be difficult for un-experienced surgeons to identify, and in some cases the wrong space may have been closed. Otherwise, in most cases, an internal hernia is easy to revert during laparoscopy by examining the small bowel proximally from the ilio-cecal junction, whereby the hernia will be released in most cases. The challenge is to identify the spaces before closing them with the correct technique. The primary diagnostic examination was a computed tomography, which identified the majority of patients with internal hernia. However, 17% of patients with a normal computed tomography were found to have an internal hernia. Therefore, there should be a low threshold for performing a diagnostic laparoscopy in cases of doubt despite normal findings on a computed tomography. It is also our impression that among radiologists there has been a learning curve in relation to the diagnosis of internal hernia. The characteristic finding on computed tomographies in patients with internal hernia consists of "mesenteric swirl", compression of the superior mesenteric vein and sometimes also dilatation of the proximal bowel [17]. In Denmark, only linear, stapled anastomosis is used, but the technique used to close the enterotomy may affect the risk of stenosis and should be registered as well [18]. Stenosis of the jejuno-jejunal anastomosis may cause gastric blow-out of the remnant stomach, which was can be avoided by placing a transcutaneous

TABLE 1

Patient data.

Gender, female/male, n	147/39
Time from LRYGB to re-operation, months, median (range)	24 (1-224)
BMI before LRYGB, kg/m^2, median (range)	45 (32-69)
BMI at admission, kg/m^2, median (range)	27 (20-56)

BMI = body mass index; LRYGB = laparoscopic Roux-en-Y gastric bypass.

TABLE 2

Complications, early/late (< 1 month/> 1 month). Time from RYGB to late complication, median (range): 24 (7-224) months. The values are n.

	< 1 month	> 1 month
Patients	40	146
Leakage, n	13	0
Abdominal pain, no findings	10	32
Stenosis	5	7
Internal hernia	4	89
Ulcer	4	7
Intestinal obstruction	1	10
Other complications (< 4 cases)	5	6

RYGB = Roux-en-Y gastric bypass.

TABLE 3

First diagnostic procedure. The values are n.

Complication	< 1 month	> 1 month
Computed tomography	13	105
Laparoscopy	9	21
Laparotomy	5	3
Gastroscopy	8	9
Magnetic resonance imaging	0	2
Ultrasonography	2	0
Observation	3	6
Total	40	146

TABLE 4

Clinical findings in patients with a normal computed tomography or during a primary diagnostic laparoscopy. The values are n.

	Normal computed tomography	Laparoscopy
Internal hernia	**6**	**18**
Abdominal pain, no findings	**22**	**1**
Leakage	**0**	**5**
Gallstone disease	**4**	**0**
Obstipation	**1**	**0**
Fistula	**1**	**0**
Perforated ulcer	**0**	**1**
Intestinal obstruction	**2**	**0**
Total	**36**	**25**

PEG tube. An additional jejuno-jejunal anastomosis may be created later thereby ensuring drainage from the biliary system and remnant stomach.

Unexplained abdominal pain was seen in a substantial subgroup of patients and this warrants further investigation. This group of patients with normal computed tomographies, laparoscopy, laparotomy and other radiological studies represents a significant challenge to the general practitioner and the bariatric team. They may often require multiple admissions and investigations to rule out any reason for pain. The aetiologies of "non-surgical" pain are diverse and may include behavioural and nutritional disorders, bacterial overgrowth or functional disorders [19]. We suggest the creation of a national referral centre for patients with chronic complications after bariatric surgery which should have a multidisciplinary team approach including psychologists, dieticians, coaches, bariatric surgeons and gastroenterologists.

CONCLUSION

The primary early complication of LRYGB patients was leakage, and internal hernia was the most frequent late complication. A substantial number of patients readmitted after LRYGB suffer from unexplained abdominal pain that should be managed by specialised centres.

CORRESPONDENCE: *Maj-Britt Errebo*, Nylands Allé 12, 8700 Horsens, Denmark. E-mail: mb123@live.no

ACCEPTED: 12 March 2014.

CONFLICTS OF INTEREST: none. Disclosure forms provided by the authors are available with the full text of this article at www.danmedj.dk.

LITERATURE

1. National Board of Health. The national health profile 2010. Copenhagen: National Board of Health, 2011.
2. Buchwald H, AVIDOR Y, Braunwald E et al . Bariatric surgery: a systematic review and meta-analysis. JAMA 2004;292:1724-37.
3. Obeid A, Long J, Kakade M et al. Laparoscopic Roux-en-Y gastric bypass: long term clinical outcomes. Surg Endosc 2012;26:3515-20.
4. Edholm D, Svensson, F, I Näslund et al. Long-term results 11 years after primary gastric bypass in 384 patients. Surg Obes Relat Dis 2013;9:708-13.
5. Sjöström L. Review of the key results from the Swedish Obese Subjects (SOS) trial – a prospective controlled intervention study of bariatric surgery. J Intern Med 2013;273:219-34.
6. Kehlet H, Naver L, Madsbad S. Report on late complications of obesity operations in Denmark 2006-2011. Copenhagen: Danish Ministry of Health, 2011.
7. Higa KD, Boone KB, Ho T. Complications of the laparoscopic Roux-en-Y gastric bypass: 1,040 patients – what have we learned? Obes Surg 2000;10:509-13.
8. Carrasquilla C, English WJ, Esposito P et al. Total stapled, total intra-abdominal (TSTI) laparoscopic Roux-en-Y gastric bypass: one leak in 1000 cases. Obes Surg 2004;14:613-7.
9. www.kcks-vest.dk/kliniske+kvalitetsdatabaser/fedmekirurgi (1 May 2013).
10. Weiner RA, El-Sayes IA, Theodoridou S et al. Early post-operative complications: incidence, management, and impact on length of hospital stay. A retrospective comparison between laparoscopic gastric bypass and sleeve gastrectomy. Obes Surg 2013;23:2004-12.
11. Heneghan HM, Meron-Eldar S, Yenumula P et al. Incidence and management of bleeding complications after gastric bypass surgery in the morbidly obese. Surg Obes Relat Dis 2012;8:729-35.
12. Carrodeguas L, Szomstein S, N Zundel et al. Gastrojejunal anastomotic strictures following laparoscopic Roux-en-Y gastric bypass surgery: analysis of 1291 patients. Surg Obes Relat Dis 2006;2:92-7.
13. Csendes A, Torres J, Burgos AM. Late marginal ulcers after gastric bypass for morbid obesity. Clinical and endoscopic findings and treatment. Obes Surg 2011;21:1319-22.
14. Higa KD, Ho T, Boone KB. Internal hernias after laparoscopic Roux-en-Y gastric bypass: incidence, treatment and prevention. Obes Surg 2003;13:350-4.
15. Bauman RW, Pirrello JR. Internal hernia at Petersen's space after laparoscopic Roux-en-Y gastric bypass: 6.2% incidence without closure-a single surgeon series of 1047 cases. Surg Obes Relat Dis 2009;5:565-70.
16. www.Clinicaltrials.org. Studies: NCT01040364 , NCT01137201 , NCT01595230 (1 May 2013).
17. Iannuccilli JD, Grand D, Murphy BL et al. Sensitivity and specificity of eight CT signs in the preoperative diagnosis of internal mesenteric hernia following Roux-en-Y gastric bypass surgery. Clin Radiol 2009;64:373-80.
18. Mueller CL, Jackson TD, Swanson T et al. Linear-stapled gastrojejunostomy with transverse hand-sewn enterotomy closure significantly reduces strictures for laparoscopic Roux-en-Y gastric bypass. Obes Surg 2013;23:1302-8.
19. Greenstein AJ, O'Rourke RW. Abdominal pain after gastric bypass: suspects and solutions. Am J Surg 2011;201:819-27.